

Appln No. 09/826,969

Amdt date August 31, 2004

Reply to Office action of June 28, 2004

REMARKS/ARGUMENTS

Claims 1 and 3-27 are now in the application. Claim 2 was previously canceled. Claims 4, 8, 9, 13, and 27 have been amended. The Applicants respectfully request reconsideration and review of the application in view of the amendment and the following remarks.

In the present Office Action, the Examiner objected to Figure 1 and required that it "should be designated by a legend such as --Prior Art-- because only that which is old is illustrated." See paragraph 2 of the Office Action. The Applicants respectfully disagree and traverse this objection. While MPEP §608.01(a) calls for a discussion of the problem solved by the present invention, courts have long recognized that a major part of an inventor's contribution often lies in his determination of the nature of the problem that was previously unappreciated by others in the art. See *Eibel Process C. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45 (1923).

Specifically, Figure 1 illustrates one example of a multi-carrier modulation system. With reference to Figure 1, in page 6, lines 5-14, the present application then discusses a problem to be solved by the present invention, such as "phase noise that often make multi-carrier modulation undesirable in low cost application." The specification then immediately discusses how "a low cost tuner may be utilized" through the tone based carrier tracking system of the present invention "by utilizing a training tone." See page 6, lines 15-22; see also page 11, lines 31-34, page 12, lines 3-4, and page 12, line 34 through

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page 13, line 16. Thus, Figure 1 is used to illustrate not "only that which is old," but also is used to illustrate some of the problems to be solved by the present invention and/or the thought process of the inventors as the invention was originated. Such private knowledge of the inventors have long been held by the courts as not properly usable against the inventors' own invention. See *In re Facius*, 408 F.2d 1396 (CCPA 1969); *Reading & Bates Construction v. Baker Energy Resources*, 748 F.2d 645 (Fed. Cir. 1984).

In addition, a full review of the present application does not indicate that the Applicants have actually (or even implicitly) admitted that Figure 1 illustrates "**only** that which is old." For example, a multi carrier modulation (MCM) transmitter (113) of Figure 1 that is transmitting the present invention's training tones ("placed at a convenient frequency location within the N independent signals" in page 13, lines 3-5 of the present application) to reduce phase noises would not be illustrating "only that which is old." Accordingly, Applicants respectfully request that the objection to Figure 1 be withdrawn. Again, the private knowledge of the inventors is not prior art against the same inventors.

With respect to the other formal objects to the drawings, annotated sheets are enclosed with markings in red to illustrate the changes made. These proposed changes to the drawings are believed to overcome the Examiner's objections. In addition, Figures 5 and 6 have been amended to correct certain minor typographical errors. Moreover, to expedite the issuance of this application into a patent, proposed replacement formal

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drawing sheets incorporating the changes shown have been submitted with this Amendment.

With respect to the objections to the specification, the identified informalities have been corrected (which are based on the Examiner's suggestions).

In addition, minor amendments have been made to the specification for clarification and consistency purposes. Specifically, in the paragraph beginning on page 12, line 3, "an MCM demodulator and FFT415" has been replaced by "an MCM demodulator and FFT 137." Similarly, in the paragraph beginning on page 17, line 15, "the MCM demodulator and FFT (415 of FIG. 3)" has been replaced by "the MCM demodulator and FFT (137 of FIG. 3)." In the paragraph beginning on page 18, line 3, " $e^{j\phi(n)}$ " has been replaced by " $e^{j\phi(t)}$ " (emphasis in bold added). In the paragraph beginning on page 18, line 34, "a phase detector 402" has been replaced by "a phase detector 410." Lastly, in the paragraph beginning on page 20, line 5, "FIG. 5a" has been replaced by "FIG. 5." It is respectfully submitted that these amendments are fully supported in the specification and are made only to correct minor typographical mistakes and do not constitute new matter(s).

The Examiner rejected claims 8, 9, and 27 under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Claims 8 and 27 have been amended to each now recite a "multi-carrier modulation receiver is disposed as a digital circuit using digital signal processing techniques." In addition, the dependency of claim 27 has been amended to now depend from claim 9 instead of claim 8.

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Claim 9 has been amended to now recite a training tone tracking circuit that includes:

- a training tone tracking circuit input;
- a training tone tracking circuit output;
- a training tone tracking PLL having a PLL input coupled to the training tone tracking circuit input and a PLL output; and
- a multiplier having a first input coupled to the PLL output of the training tone tracking PLL, a second input coupled to the training tone tracking circuit input, and an output coupled to the training tone tracking circuit output.

In view of the forgoing, the Applicants respectfully submit that the current recitations of claims 8, 9, and 27 are sufficiently described in the specification and the rejections under 35 U.S.C. §112, first paragraph, should now be withdrawn.

The Applicants acknowledge with appreciation the allowance of claims 4-6 and the indication of allowable subject matter in claims 13-26. See page 12 of the Office Action and the Office Action Summary. Claim 4 has been amended to correct a minor typographical error. Claim 13 has been amended to incorporated all the recitals of its respective base claim 7, and the remaining dependent claims 14-26 all depend (directly or indirectly) from claim 13. Accordingly, claims 4-6 and 13-26 should also now be allowed.

Claims 1, 3, 7, 9, and 10 presently stand rejected under 35 U.S.C. §103(a) over the admitted prior art of the instant application (e.g., Figure 1) in view of Dapper (U.S. Patent No. 6,275,990). The rejections are respectfully traversed.

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Initially, with respect to claims 1 and 7, the Applicants would like to note that they have not actually (or even implicitly) admitted that their "down converted signal including a plurality of data tones for transmitting data and **training tones for carrier phase error correction** (Fig. 1 element 117); **sampling a training tone of the down-converted signal to provide received data samples** (Fig. 1 element 131)" (emphasis in bold added) is "admitted prior art." See pages 7 and 10 of the Office Action on the reasons in rejecting claims 1 and 7. To the contrary, the Applicants respectfully believe that a multi carrier modulation (MCM) transmitter shown in Figure 1 that is transmitting the present invention's training tones (e.g., "placed at a convenient frequency location within the N independent signals" in page 13, lines 3-5, of the present application) to reduce phase noises would not be illustrating "**only** that which is old." Accordingly, the Applicants respectfully disagree that the current claim recitations of:

time domain down converting the received multi-carrier signal to base-band to provide a down-converted signal, the down-converted signal including a plurality of data tones for transmitting data and training tones for carrier phase error correction; sampling a training tone of the down-converted signal to provide received data samples (as recited in claim 1)

or

a signal transmitted from the multi-carrier modulation transmitter, the received signal being applied to the down conversion circuit to produce a down converted signal, the down converted signal being applied to the training tone tracking circuit to

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correct phase and frequency errors (as recited in claim 7 and emphasis in bold added).

can be considered as "admitted prior art."

Similarly, with respect to claim 3, the Applicants respectfully disagree that the current claim recitations of:

time domain down-converting the received multi-carrier signal to base-band to provide a down-converted signal, the down-converted signal including a plurality of data tones for transmitting data and training tones for carrier phase error correction

can be considered as "admitted prior art."

In addition, Dapper's discloses a frequency that has been shifted. This shifted frequency is then fed into Dapper's phase locked loop (PLL) to compensate for phase and frequency errors of the **same** frequency that has been frequency shifted (and containing the phase and frequency errors). See Col. 28, lines 16-29. Dapper does not disclose or suggest the use of a first tone (e.g., a training tone) to correct phase errors of another type of tones (e.g., data tones).

Thus, with respect to claim 1, Dapper alone or in combination with APA (for the sake of argument that it is proper) still does not disclose or suggest "**estimating phase errors from** a phase difference between **the training tone** and the reference signal derived from the training tone of the down-converted signal **to provide** a plurality of received sample **phase error estimates for each data tone**" as defined in claim 1, emphasis in bold added. Accordingly, the rejection of claim 1,

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as well as the rejection of independent claim 7, which has similar limitation(s), should be withdrawn.

Similarly, Dapper and/or APA does not disclose or suggest:

estimating time domain phase errors from a phase difference between the time-domain phase samples of each training tone and the reference signal derived from the training tones of the down-converted signal to provide a plurality of time domain received sample phase error estimates for each time-domain received data sample of the received multi-carrier signal;

coherently combining the time domain received sample phase error estimates of each of the plurality of training tones to provide a single coherently combined time-domain phase error estimate;

applying the single coherently combined time-domain phase error estimate to the time-domain down-converted received multi-carrier signal to compensate for MCM signal frequency and phase errors

as defined in claim 3.

Claims 8-12 and 27 depend, directly or indirectly, from claim 7, and incorporate all the terms and limitations of claim 7 in addition to other limitations, which together further patentably distinguish them over the cited references. Therefore, these dependent claims should also now be allowed.

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In view of the foregoing, the Applicants respectfully submit that claims 1 and 3-27 are in condition for allowance. Reconsideration and withdrawal of the rejection is respectfully requested, and a timely Notice of Allowability is solicited. If there are any remaining issues that can be addressed over the telephone, the Examiner is encouraged to call Applicants' attorney at the number listed below.

Respectfully submitted,

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